



(12) **EUROPEAN PATENT APPLICATION**

(88) Date of publication A3:
24.09.2014 Bulletin 2014/39

(51) Int Cl.:
H01J 37/09^(2006.01) H01J 37/28^(2006.01)

(43) Date of publication A2:
03.03.2010 Bulletin 2010/09

(21) Application number: **09252073.3**

(22) Date of filing: **26.08.2009**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
AL BA RS

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(30) Priority: **29.08.2008 JP 2008221698**

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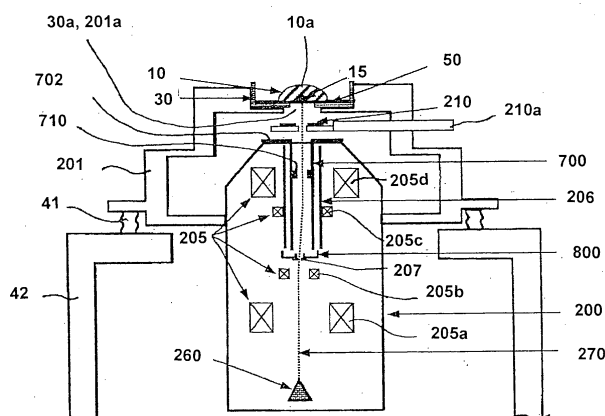
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(54) **Particle beam system with anti-contamination shield**

(57) A particle beam system is offered which can prevent contamination of the inside of the objective lens (205d) that is a component important for the performance even if a film (50) holding a specimen (10) is damaged, the objective lens (205d) being located at the front end of the optical column (200). If any parts in the column (200) are contaminated, they can be easily removed. The particle beam system has an optical column (200) equipped with a particle beam source (260) for emitting a particle beam (270) and a beam passage pipe (206)

through which the beam (270) passes. The system further includes a vacuum chamber (201) connected with the front end portion of the column (200). The beam (270) passed through the pipe (206) is released from the front end of the column (200). A tubular member (700) is detachably disposed inside the beam passage pipe (206) located at the front-end side of the column (200). The beam (270) released from the column (200) is made to impinge on the specimen (10).

(Fig.1)





EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 2007 305499 A (HITACHI HIGH TECH CORP) 22 November 2007 (2007-11-22) * abstract * * paragraphs [0020] - [0035]; figures 1-4 *	1,2,4,6,7	INV. H01J37/09 H01J37/28
X	----- US 5 376 792 A (SCHAMBER FREDERICK H [US] ET AL) 27 December 1994 (1994-12-27) * abstract * * column 5, line 34 - column 8, line 62; figure 6 * * column 1, line 11 - column 2, line 14 *	1,2,4-7	
X	----- JP 2008 010177 A (HITACHI HIGH TECH CORP) 17 January 2008 (2008-01-17) * abstract * * paragraphs [0013] - [0032]; figures 1-4 *	1-4,6,7	
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A,D	----- JP 2007 292702 A (JEOL LTD) 8 November 2007 (2007-11-08) * abstract; figures 1-4 *	18-23	TECHNICAL FIELDS SEARCHED (IPC) H01J
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 August 2014	Examiner Lang, Thomas
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☒ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

1-7, 11, 12, 18-23

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



LACK OF UNITY OF INVENTION **SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7

A particle beam system comprising an optical column equipped with a particle beam source for producing a particle beam and a beam passage pipe through which the particle beam passes, and having a front end from which the particle beam passed through the beam passage pipe is released; and a vacuum chamber connected with the front end portion of the optical column; wherein a tubular member is detachably disposed in the beam passage pipe located at a side of the front end of the optical column, and wherein the particle beam passed through the tubular member and released from the optical column is made to impinge on a specimen (claim 1); wherein said tubular member is disposed in such a way that it can be inserted and detached from the front end of the optical column (claim 2); wherein said tubular member has a stopper located outside the front end of said optical column (claim 3).

2. claims: 8-10

A particle beam system as set forth in claim 1, wherein said tubular member is made of any one of copper, phosphor bronze, and an aluminum alloy (claim 8); or wherein said tubular member is made of a sheet of an aluminum alloy or an electrically conductive sheet fabricated by coating a surface of a sheet of paper or resin with aluminum (claims 9, 10).

3. claims: 11, 12

A particle beam system as set forth in claim 1, wherein an aperture member having an opening is disposed in said optical column and aligned with a base end of said tubular member, and wherein a receiver dish is held to the aperture member and movable together with the receiver dish.

4. claims: 13-17

A particle beam system as set forth in claim 1, wherein said tubular member has an inner wall surface that has been plasma treated or UV treated (claim 13); or wherein said tubular member has an inner wall surface on which a layer of a water-absorbing material is formed (claims 14-17).

5. claims: 18-23

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

A particle beam system as set forth in claim 1, wherein a base end of said optical column where said particle beam source is located is under the front end of the optical column at which a front end of said beam passage pipe is located (claim 18); or wherein said particle beam released from said optical column is made to impinge on the specimen via a film that can transmit the particle beam, and wherein there is further provided a detector for detecting a secondary signal produced from the specimen in response to the impingement (claims 19-23).

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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14-08-2014

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82